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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/066,671	02/06/2002	Koichiro Hirao	Q68367	4642

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EXAMINER

LAROSE, COLIN M

ART UNIT	PAPER NUMBER
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2624

DATE MAILED: 08/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/066,671

Applicant(s)

HIRAO, KOICHIRO

Examiner

Colin M. LaRose

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 April 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 7-11 and 16-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 12-15 and 20 is/are rejected.
- 7) ☒ Claim(s) 21 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3 April 2006 has been entered.

Response to Amendments and Arguments

2. Applicant has amended independent claims 1 and 12 to denote that the predetermined pixels surrounding the target pixel are "in an x-y plane where x is in a main scanning direction and y is in a sub-scanning direction."

Applicant's remarks regarding newly-amended independent claims 1 and 12 have been considered but are not persuasive for the following reasons. Applicant asserts that the previous combination of Watanabe and Kim is invalid because Kim "fails to teach or suggest an analysis of a target pixel in a physical x-y space, rather the analysis of the target is in an RGB space, as illustrated in Figure 10" (see Remarks, p. 12).

Figure 10 merely illustrates that luminance Y is a linear combination of the R, G, and B values and therefore forms a plane in the 3-D RGB space. It further shows the relationship between RGB color values and a luminance plane Y, and how a shift in a given color $C \rightarrow C'$ corresponds to a shift in the luminance plane $Y \rightarrow Y'$.

It is unclear how figure 10 of Kim supports the Applicant's assertion that Kim does not utilize predetermined pixels "in an x-y plane," as claimed. As explained in the previous Office action, Kim's YUV signals are "digital" color signals (column 3, lines 55-60), and $Y[i][j]$ refers to an input "sample" (column 5, lines 65-67), which is equivalent to the Y component of a YUV picture element at the location (i,j) in the digital image. In other words, Kim's disclosure is directed to processing a standard 2-D digital color image having pixels organized in a rectangle. The notation $Y[i][j]$ references the luminance value of a pixel located at the (i,j) location in the image, where i and j correspond to the x and y positions. See e.g. equation (4) in column 6, where $Y[i][j]$ is denoted as a center pixel value and relative variations of i and j correspond to relative variations in the (x,y) location for a given pixel. There appears to be nothing in Kim that suggests that the image processed therein is not a standard 2-D digital image that necessarily consists of pixels extending in two orthogonal axes -- an x direction (or "main scanning" direction), and a y direction (or "sub scanning" direction).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-6, 12-15, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,823,083 by Watanabe et al. ("Watanabe") in view of U.S. Patent 6,078,686 by Kim.

Regarding claims 1 and 12, Watanabe discloses a color image processing device/method (figure 8) comprising:

a color space converter (11) for converting image signals to luminance signals corresponding to luminance and first and second chromaticity signals corresponding to chromaticity (i.e. converts RGB into YCC);

a luminance signal correcting unit (16) for correcting the luminance signal of a target pixel based on a saturation signal corresponding to saturation of the target pixel (saturation correcting circuit 18 corrects the luminance signal based on a maximum saturation C_{max1} for a target pixel – see e.g. column 10, lines 8-31);

a chromaticity signal correcting unit (16) for correcting the first and second chromaticity signals (Cb and Cr) of the target pixel based on first and second average chromaticity signals (CbHL and CrHL, calculated from “all pixels” – column 9, lines 34-36) obtained from the chromaticity signals of the target pixel and the predetermined pixels surrounding the target pixel, the saturation signal of the target pixel, an average saturation signal (Cmean) of the target pixel and the predetermined pixels surrounding the target pixel (Cmean, calculated from all pixels in one frame – column 9, lines 34-36), and a hue difference signal (Cb1/Cr1) representing color similarity which is obtained from the first and second chromaticity signals and the first and second average chromaticity signals (Cb1 and Cr1) (see column 9, line 26 through column 10, line 46: the CbHL, CrHL, Cmean, Cb1, and Cr1, corresponding to the claimed “first and second average chromaticity signals,” “average saturation signal,” and “hue difference signal,” are used to correct the chromaticity signals (Cb and Cr) of the image); and

a color space inverter (19) for inverting the corrected luminance signal, the corrected first chromaticity signal and the corrected second chromaticity signal to image signals (i.e. converts YCC into RGB or CYMK or the like for displaying or printing).

Watanabe does not disclose correcting the luminance signal of a target pixel based on an average luminance signal obtained from luminance signals of the target pixel and predetermined pixels surrounding the target pixel, as claimed.

Kim discloses a circuit (figure 1) for enhancing color image signals. In particular, Kim discloses converting RGB signals into YUV signals for the purposes of correction. Also, Kim discloses correcting the luminance signal based on a local average of luminance pixels in order to reduce noise. The first noise reducer 200 generates the mean luminance value in a window around a target pixel in an x-y plane, corresponding to main- and sub-scanning directions, and corrects the luminance signal based thereon (see figure 2).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Watanabe by Kim to correct the luminance based on an average luminance signal in addition to a saturation signal, since Kim discloses that correcting a luminance signal based on the average thereof is desirable in that the noise of the luminance signal is reduced.

Regarding claims 2, 3, and 13, the combination of Watanabe and Kim teaches the luminance signal correcting unit comprises a luminance correcting factor calculator for determining a luminance correcting level for correcting the luminance signal of the target pixel based on the average luminance signal and the saturation signal of the target pixel (i.e. after the

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luminance signal has been noise-reduced by averaging per Kim's teaching, it is subject to Watanabe's correction process at circuit 16, which determines a saturation-corrected luminance level based on the averaged luminance values and the saturation of the target pixel – see e.g. column 10, lines 13-60: "saturation correction are repeated with respect to the luminance data Y ... corresponding to each and every pixel").

Regarding claims 4 and 14, Watanabe discloses

a saturation calculator for generating a saturation signal of the target pixel based on the first and second chromaticity signals;

an average saturation calculator for generating the average saturation signal based on the first and second average chromaticity signals; and

a hue difference calculator for generating the hue difference signal based on the first and second chromaticity signals as well as the first and second average chromaticity signals (circuit 16 performs these three calculations for Cmax1, Cmean, Cb1, and Cr1, corresponding to the claimed "saturation," "average saturation signal," and "hue difference signal," – see column 9, line 26 through column 10, line 43).

Regarding claims 5, 6, and 15, Watanabe discloses the chromaticity signal correcting unit comprises a color correcting factor calculator (circuit 18) for determining the chromaticity correcting level for correcting the first and second chromaticity signals of the target pixel based on the saturation signal of the target pixel, the average saturation signal, and the hue difference signal (i.e. the saturation corrector 18 uses the Cmax1, Cmean, Cb1, and Cr1 signals to determine the levels (Cb2, Cr2) at which the chroma signals are to be corrected – see column 10, lines 35-46).

Regarding claim 20, Watanabe discloses only correcting the luminance signal when the saturation signal of the target pixel is lower than a luminance correction threshold (see column 10, line 66 through column 11, line 7: when saturation emphasizing is to be performed, correction to the image signal, including the luminance signal, is only carried out when the saturation is below the maximum saturation level).

Allowable Subject Matter

5. Claim 21 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claim 21, Watanabe is silent to using two different equations based on the hue difference signal, as claimed. Rather, Watanabe only utilizes a signal equation for determining the chromaticity correcting level.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colin M. LaRose whose telephone number is (571) 272-7423. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu, can be reached on (571) 272-7429. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

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may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000. Any inquiry of a general nature or relating to the status of this application or proceeding can also be directed to the TC 2600 Customer Service Office whose telephone number is (571) 272-2600.



Colin M. LaRose
Group Art Unit 2624
27 July 2006